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EXAMINER
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SHIBUYA, MARK LANCE

ART UNIT	PAPER NUMBER
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1639

DATE MAILED: 08/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/816,603

Applicant(s)

WYBOURNE ET AL.

Examiner

Mark L. Shibuya

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 30 May 2006.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-7 and 9-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7 and 9-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

1. Claims 1-13 are pending. Claim 8 is withdrawn from consideration. Claims 1-7 and 9-13 are examined.

#### ***Election/Restrictions***

2. Applicant's election of the species of thiol ligand that is mercaptoundeconoic acid; and election of a substrate that comprises silicon nitride, in the reply filed on 2/13/2006, is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the requirement for election of species, the election has been treated as an election without traverse.

3. Applicant, in the Reply, entered 5/30/2006, at p. 1, in answer to the Supplemental Requirement for Election of Species, mailed 4/27/2006, states that mercaptoundecanoic acid and mercaptoundeconoic acid are synonyms, and that mercaptoundeconoic acid has a chemical formula that is  $\text{HS}(\text{CH}_2)_{10}\text{CO}_2\text{H}$ . Therefore, the examiner respectfully submits that applicant admits that "11-mercaptoundeconoic acid", (as in claim 1) and "mercaptoundecanoic acid", (as in new claim 11), are the same compound.

4. Claim 8 is withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim.

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Election was made **without** traverse in the reply filed on 2/13/2006. Applicant states that claims 1-7 and 9-13 read on the species of mecaptoundecanoic acid and that claims 1-13 read on the species of silicon nitride.

5. The search of the different species of substrate found in claim 12, is extended to silicon.

***Priority***

6. This application, filed 4/2/2004, states that it is a continuation of 10/013,334, filed 11/5/2001, now abandoned; which is a continuation of 09/085,390, filed 5/27/1998, now abandoned; which claims benefit of 60/047,804, filed 5/27/1997.

7. Applicant's claim for the benefit of a prior-filed application under 35 U.S.C. 119(e) or under 35 U.S.C. 120, 121, or 365(c) is acknowledged. Applicant's arguments that the claims limitations of e.g. "linear"; "organized"; "electrically isolated"; "one dimensional arrays"; and "current above a threshold in applied voltage" find support in the priority documents, are rendered moot in view of applicant's amendments to the claims, entered 10/13/2005.

8. The examiner respectfully finds persuasive applicant's arguments, entered 10/13/2005, that the new claim limitation "predetermined positions", (as in newly added

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claim 4), is supported by prior family applications 10/013,334; 09/085,390; and 60/047,804.

9. Applicant's claim for the benefit of a prior-filed application under 35 U.S.C. 119(e) or under 35 U.S.C. 120, 121, or 365(c) is acknowledged. Applicant has not complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. 119(e) as follows:

The later-filed application must be an application for a patent for an invention which is also disclosed in the prior application (the parent or original nonprovisional application or provisional application). The disclosure of the invention in the parent application and in the later-filed application must be sufficient to comply with the requirements of the first paragraph of 35 U.S.C. 112. See *Transco Products, Inc. v. Performance Contracting, Inc.*, 38 F.3d 551, 32 USPQ2d 1077 (Fed. Cir. 1994).

The disclosure of the prior-filed application, Provisional Application No. 60/047,804, filed 5/27/1997, fails to provide adequate support or enablement in the manner provided by the first paragraph of 35 U.S.C. 112 for one or more claims of this application. The newly amended claim 1 and the newly added claim 11 are drawn to arrays comprising thiol ligands that are 11-mercaptoundecanoic acid, thiopropionic acid, and mercaptoundecanoic acid; however none of said thiol ligands find support in said Provisional application. Therefore, priority is only granted for said claims 1 and 11 to Application No. 09/085,390, filed 5/27/1998.

***Specification***

10. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: Claim 4 states the language "predetermined positions", which does not find antecedent basis in the specification. The objection is necessitated by applicant's amendments to the claims, and in view of applicant's arguments regarding the language "predetermined positions", (see, above, ***Priority***).

***Withdrawn Claim Objections/Rejections***

11. The rejection of Claims 1-3 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention, is withdrawn in view of applicant's amendments to the claims.

12. The rejection of Claim 1 under 35 U.S.C. 102(a,b,e) as being anticipated by Heath et al. U.S.Pat. No. 6,159,620 (12/00: filed 3/97) alone and in combination with the specification (e.g. pages 10-11) as evidence of inherency, is withdrawn in view of applicant's amendments to the claims.

13. The rejection of Claim 1 under 35 U.S.C. 102(a,b) as being anticipated by Peschel et al., Angew Chem. Int Ed. Vol. 34 No. 13/14 (1995) pages 1442-1443, alone

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and in combination with the specification (e.g. pages 10-11) as evidence of inherency, is withdrawn in view of applicant's amendments to the claims.

14. The rejection of Claims 1-2 under 35 U.S.C. 102(a,b) as being anticipated by Alivisatos et al. Nature Vol. 382 (Aug. 15 1996) pages 609-611 alone and in combination with the specification as evidence of inherency, is withdrawn in view of applicant's amendments to the claims.

15. The rejection of Claims 1-3 under 35 U.S.C. 102(a,b,e) as being anticipated under 35 U.S.C. 102(a,b) over Wybourne et al. WO 98/53841 (12/98: filed 5/97), is withdrawn in view of applicant's amendments to the claims.

16. The rejection of Claims 1-3 under 35 U.S.C. 102(a,b,e) as being anticipated by Hainfeld et al. US Pat. No. 5,521,289 (5/96: filed 7/94) alone and further in view of specification in order to demonstrate inherency, is withdrawn in view of applicant's amendments to the claims.

17. The rejection of Claims 1-3 under 35 U.S.C. 103(a) as being unpatentable over Hainfeld et al. US Pat. No. 5,521,289 (5/96: filed 7/94) [alone and further in view of specification in order to demonstrate inherency (e.g. of polylysine); see e.g. MPEP 2131.01(d)] and Andres et al., Science Vol. 273, pages 1690-1693 (9/96), is withdrawn in view of applicant's amendments to the claims.

***Claim Rejections - 35 USC § 112***


18. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

19. Claims 4 and 11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The rejection is necessitated by applicant's amendments to the claims.

Claim 4 states the language "at predetermined positions", which renders the claims vague and indefinite, because it is unclear as to whether it is the metal clusters or the scaffold that is coupled at said predetermined positions.

Claim 11 appears to improperly recite a Markush group in lines 1-2, rendering the claim vague and indefinite, and instead probably should recite: --wherein the thiol ligand is selected from the group consisting of thiopropionic acid and mercaptoundecanoic acid.-- See MPEP 2173.05(h). Furthermore, the examiner respectfully notes that applicant has stipulated that 11-mercaptoundecanoic acid and mercaptoundecanoic acid are the same. However, the examiner respectfully expresses the opinion that using two different terms to refer to the same claim element, invites confusion.





***Claim Rejections - 35 USC § 102***

20. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

21. Claims 4, 5, 7, 9, 10, and 13 are rejected under 35 U.S.C. 102(a,e) as being anticipated by Hainfeld et al. US Pat. No. 5,521,289 (5/96: filed 7/94). This rejection is necessitated by applicant's amendments to the claims.

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The claims are drawn to an array of metal clusters, comprising: a substrate; monodispersed, thiol-stabilized gold clusters having metal-cluster radiuses of from about 0.7 nm to about 1.8 nm; and a polylysine scaffold having a lateral definition of about 10 Å coupled to the substrate, the metal clusters being coupled to the scaffold and the scaffold being coupled to the substrate at predetermined positions; and variations thereof.

Hainfeld et al. US Pat. No. 5,521,289 (5/96: filed 7/94), throughout the patent and abstract, and at col. 7, lines 3-22, teach thiol gold clusters, which read on an array of metal clusters. As stated in the previous Office action, in rejecting former claims 1-3 over Hainfeld, it is also respectfully noted that the term "array" is defined as "any arrangement of plural such clusters" that is useful for forming electronic devices, the bolded language representing "intended use" language which is not afforded patentable weight. Hainfeld et al., disclose thiol gold clusters comprising a substrate that is a lipid which form micelles and vesicles, (Hainfeld at col. 2, line 61-67, col. 8, lines 43-65) having metal cores, reading on metal clusters of about 1.4 nm in diameter, reading on radii with the range of 0.7 nm to about 1.8 nm (as in the claims) and that comprise about 50-70 metal atoms that that forms monodispersed, thiol-stabilized gold clusters.

It is respectfully noted that the specification at p. 8, lines 8-10, states that "[m]onodispersed" refers to the formation of a population of metal clusters of substantially the same size, i.e., having substantially the same radiuses (or diameters)." Thus, the examiner respectfully submits that clusters comprising a range of 50-70 atoms represent clusters of substantially the same size, particularly given that the

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specification, at p. 8, lines 12-24, discloses that "[a] completely monodispersed population is one in which the size of the metal clusters is identical. However, complete monodispersity is difficult, if not impossible, to achieve."

Hainfeld, at col. 8, line 64, discloses linking the thiol gold cluster to a polylysine linker, reading on a polylysine scaffold. As the teaching of Hainfeld in regards to the polylysine linker meets the claimed limitation of a polylysine scaffold, the polylysine of Hainfeld would have, absent evidence to the contrary, a lateral definition of about 10 Å, as in instant claims 4, and 13.

Hainfeld, at col. 8, line 55-65, teach coupling the gold cluster bound to the organic polylysine group and then to the lipid, reading on the claimed metal clusters being coupled to the scaffold and the scaffold being coupled to the substrate; Hainfeld at col. 8, lines 55-58, teach these said coupling according to the formula M-Or-L, reading on coupling at predetermined positions.

Hainfeld et al., at col. 7, lines 1-22, teach thiol ligands that include alkyl thiols, aryl thiols, and thiolbenzoic acid, reading on the thiol ligands of instant claims 7, 9, 19; and variations thereof.

### ***Claim Rejections - 35 USC § 103***

22. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

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invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

23. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

24. Claims 4, 5, 7, 9, 10, **12** and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Hainfeld et al. US Pat. No. 5,521,289** (5/96: filed 7/94) [alone and further in view of specification in order to demonstrate inherency (e.g. of polylysine)] and **Stanbro, US 5,082,627**.

The claims are drawn to an array of metal clusters, comprising: a substrate; monodispersed, thiol-stabilized gold clusters having metal-cluster radiuses of from about 0.7 nm to about 1.8 nm; and a polylysine scaffold having a lateral definition of about 10 Å coupled to the substrate, the metal clusters being coupled to the scaffold and the scaffold being coupled to the substrate at predetermined positions; and variations thereof.

**Hainfeld et al. US Pat. No. 5,521,289** (5/96: filed 7/94), throughout the patent and abstract, and at col. 7, lines 3-22, teach thiol gold clusters, which read on an array of metal clusters. As stated in the previous Office action, in rejecting former claims 1-3 over Hainfeld, it is also respectfully noted that the term "array" is defined as "any arrangement of plural such clusters" that is useful for forming electronic devices, the bolded language representing "intended use" language which is not afforded patentable weight. Hainfeld et al., disclose thiol gold clusters comprising a substrate that is a lipid which form micelles and vesicles, (Hainfeld at col. 2, line 61-67, col. 8, lines 43-65) having metal cores, reading on metal clusters of about 1.4 nm in diameter, reading on radii with the range of 0.7 nm to about .1.8 nm (as in the claims) and that comprise about 50-70 metal atoms that that forms monodispersed, thiol-stabilized gold clusters.

It is respectfully noted that the specification at p. 8, lines 8-10, states that "[m]onodispersed" refers to the formation of a population of metal clusters of substantially the same size, i.e., having substantially the same radiuses (or diameters)." Thus, the examiner respectfully submits that clusters comprising a range of 50-70 atoms represent clusters of substantially the same size, particularly given that the specification, at p. 8, lines 12-24, discloses that "[a] completely monodispersed population is one in which the size of the metal clusters is identical. However, complete monodispersity is difficult, if not impossible, to achieve."

Hainfeld, at col. 8, line 64, discloses linking the thiol gold cluster to a polylysine linker, reading on a polylysine scaffold. As the teaching of Hainfeld in regards to the polylysine linker meets the claimed limitation of a polylysine scaffold, the polylysine of

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Hainfeld would have, absent evidence to the contrary, a lateral definition of about 10 Å, as in instant claims 4, and 13.

Hainfeld, at col. 8, line 55-65, teach coupling the gold cluster bound to the organic polylysine group and then to the lipid, reading on the claimed metal clusters being coupled to the scaffold and the scaffold being coupled to the substrate; Hainfeld at col. 8, lines 55-58, teach these said coupling according to the formula M-Or-L, reading on coupling at predetermined positions.

Hainfeld et al., at col. 7, lines 1-22, teach thiol ligands that include alkyl thiols, aryl thiols, and thiolbenzoic acid, reading on the thiol ligands of instant claims 7, 9, 19; and variations thereof.

Hainfeld et al., do not teach arrays of gold clusters, wherein the substrate comprises silicon, silicon nitride, ultraflat glass, gold or a combination thereof.

**Stanbro, US 5082627**, throughout the patent and specifically at the abstract, discloses and states:

A dielectric material of a capacitive affinity sensor has a three-dimensional molecular binding site array. A glass base is layered with a binding agent like silane from which a polymeric backbone like polylysine extends. The polymeric backbone is prepared to accept receptor molecules like cortisol hemisuccinate to bind a specific antibody. Such an array changes dielectric properties between the two electrodes of the capacitive affinity sensor to greatly enhance sensitivity of the sensor.

Stanbro at the abstract. The glass substrate of Stanbro is taken to read on the substrate comprising silicon of instant claim 12.

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It would have been *prima facie* obvious, at the time the invention was made, for one of ordinary skill in the art to have made and used arrays of gold clusters, wherein the substrate comprises glass, which reads on the silicon substrate of instant claim 12.

One of ordinary skill in the art would have been motivated to make and use arrays of gold clusters, wherein the substrate comprises silicon, because Stanbro teaches making such arrays comprising polylysine attached through silane to glass substrates for attaching molecules for immunoassay, wherein the sensitivity of detection of binding is greatly enhanced using the dielectric properties of the array; and because Hainfeld et al., at col. 2, lines 49-56, teach using gold clusters in assays comprising, e.g., antibodies, and antibody fragments.

One of ordinary skill in the art would have had a reasonable expectation of success making in arrays of gold clusters, wherein the substrate comprises silicon, because the binding of polylysine to substrates, such as electrodes, was known in the art.

25. Claims 1-3, 6, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Hainfeld et al. US Pat. No. 5,521,289** (5/96: filed 7/94) [alone and further in view of specification in order to demonstrate inherency (e.g. of polylysine)] and **Stanbro, US 5,082,627** as applied to claims 4, 5, 7, 9, 10, 12 and 13 above, and further in view of **Kornguth et al., US 5,629,213 A**.

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The claims are drawn to an array of gold clusters, comprising: monodispersed, 11-mercaptoundecanoic acid ligand-stabilized gold clusters having metal-cluster radiuses of from about 0.7 nm to about 1.8 nm; a polylysine scaffold, the metal clusters being bonded to the scaffold; and a substrate, the scaffold being coupled to the substrate; and variations thereof.

The teaching of **Hainfeld et al. US Pat. No. 5,521,289** (5/96: filed 7/94) [alone and further in view of specification in order to demonstrate inherency (e.g. of polylysine)] and **Stanbro, US 5,082,627** are relied upon, as above.

**Hainfeld et al. US Pat. No. 5,521,289** (5/96: filed 7/94), throughout the patent and abstract, and at col. 7, lines 3-22, teach thiol gold clusters, which read on an array of metal clusters. As stated in the previous Office action, in rejecting former claims 1-3 over Hainfeld, it is also respectfully noted that the term "array" is defined as "any arrangement of plural such clusters" that is useful for forming electronic devices, the bolded language representing "intended use" language which is not afforded patentable weight. Hainfeld et al., disclose thiol gold clusters comprising a substrate that is a lipid which form micelles and vesicles, (Hainfeld at col. 2, line 61-67, col. 8, lines 43-65) having metal cores, reading on metal clusters of about 1.4 nm in diameter, reading on radii with the range of 0.7 nm to about 1.8 nm (as in the claims) and that comprise about 50-70 metal atoms that that forms monodispersed, thiol-stabilized gold clusters.

It is respectfully noted that the specification at p. 8, lines 8-10, states that "[m]onodispersed" refers to the formation of a population of metal clusters of substantially the same size, i.e., having substantially the same radiuses (or diameters)."



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Thus, the examiner respectfully submits that clusters comprising a range of 50-70 atoms represent clusters of substantially the same size, particularly given that the specification, at p. 8, lines 12-24, discloses that “[a] completely monodispersed population is one in which the size of the metal clusters is identical. However, complete monodispersity is difficult, if not impossible, to achieve.”

Hainfeld, at col. 8, line 64, discloses linking the thiol gold cluster to a polylysine linker, reading on a polylysine scaffold. As the teaching of Hainfeld in regards to the polylysine linker meets the claimed limitation of a polylysine scaffold, the polylysine of Hainfeld would have, absent evidence to the contrary, a lateral definition of about 10 Å, as in instant claims 2, 4, and 13.

Hainfeld, at col. 8, line 55-65, teach coupling the gold cluster bound to the organic polylysine group and then to the lipid, reading on the claimed metal clusters being coupled to the scaffold and the scaffold being coupled to the substrate; Hainfeld at col. 8, lines 55-58, teach these said coupling according to the formula M-or-L, reading on coupling at predetermined positions.

Hainfeld et al., at col. 7, lines 1-22, teach thiol ligands that include alkyl thiols, aryl thiols, and thiolbenzoic acid, reading on the thiol ligands of instant claims 7, 9, 19; and variations thereof.

It is noted that “polylysine” *inherently* is a “helical peptide” within the presently claimed scope since “The free base form of polylysine readily forms an alpha helix” and “[M]oreover, lysine provides a terminal amino group that is oriented favorably in the

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alpha helix for ligand exchange reactions with the ligand-stabilized metal clusters". See specification at page 15, lines 15-24. Thus claim 3 is rendered obvious.

**Stanbro, US 5082627**, throughout the patent and specifically at the abstract, discloses and states:

A dielectric material of a capacitive affinity sensor has a three-dimensional molecular binding site array. A glass base is layered with a binding agent like silane from which a polymeric backbone like polylysine extends. The polymeric backbone is prepared to accept receptor molecules like cortisol hemisuccinate to bind a specific antibody. Such an array changes dielectric properties between the two electrodes of the capacitive affinity sensor to greatly enhance sensitivity of the sensor.

Stanbro at the abstract. The glass substrate of Stanbro is taken to read on the substrate comprising silicon of instant claim 12.

Each of Hainfeld et al. and Stanbro, separately or in combination together, do not teach mercaptoundecanoic acid, as in claims 1 and 11; and do not teach gold clusters that are electrostatically coupled to the scaffold, as in claim 6.

**Kornguth et al., US 5,629,213 A**, throughout the patent and abstract, and at col. 2, line 52-col. 3, line 2, teach arrays comprising 11-mercaptoundecanoic acid, gold, and polylysine through electrostatic coupling, as a preferred embodiment, because 11-mercaptoundecanoic acid is capable of adsorption onto gold through the sulfhydryl group, and the resulting polyanionic surface provides for the robust yet reversible electrostatic adsorption of the polycation polylysine. Kornguth et al., at col. 2, lines 41-51, teach arrays comprising substrates of gold.

It would have been *prima facie* obvious, at the time the invention was made, for one of ordinary skill in the art to have made and used an array of gold clusters,

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comprising 11-mercaptoundecanoic acid ligand-stabilized gold clusters; and wherein gold clusters that are electrostatically coupled to the scaffold.

One of ordinary skill in the art would have been motivated to make and use an array of gold clusters, comprising 11-mercaptoundecanoic acid ligand-stabilized gold clusters; and wherein gold clusters that are electrostatically coupled to the scaffold, because Kornguth et al. disclose that 11-mercaptoundecanoic acid is capable of adsorption onto gold through the sulfhydryl group, and the resulting polyanionic surface provides for the robust yet reversible electrostatic adsorption of the polycation polylysine.

One of ordinary skill in the art would have had a reasonable expectation of success in making and using array of gold clusters, comprising 11-mercaptoundecanoic acid ligand-stabilized gold clusters; and wherein gold clusters that are electrostatically coupled to the scaffold, because the polycationic character of polylysine was well-known in the art ; and because the use of 11-mercaptoundecanoic acid to adsorb onto gold was well known in the art, as evidenced by Templeton et al., J. Am. Chem. Soc. 1998, vol. 120, pp. 4845-4849; and Bain et al., J. Am. Chem. Soc. 1989, vol. 111, pp. 321-335.

26. Claims 1-7, 9-11 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Hainfeld et al. US Pat. No. 5,521,289** (5/96: filed 7/94) [alone and

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further in view of specification in order to demonstrate inherency (e.g. of polylysine)] and **Kornguth et al., US 5,629,213 A.**

The claims are drawn to an array of gold clusters, comprising: monodispersed, 11-mercaptoundecanoic acid ligand-stabilized gold clusters having metal-cluster radiuses of from about 0.7 nm to about 1.8 nm; a polylysine scaffold, the metal clusters being bonded to the scaffold; and a substrate, the scaffold being coupled to the substrate; and variations thereof.

**Hainfeld et al. US Pat. No. 5,521,289** (5/96: filed 7/94), throughout the patent and abstract, and at col. 7, lines 3-22, teach thiol gold clusters, which read on an array of metal clusters. As stated in the previous Office action, in rejecting former claims 1-3 over Hainfeld, it is also respectfully noted that the term "array" is defined as "any arrangement of plural such clusters" that is useful for forming electronic devices, the bolded language representing "intended use" language which is not afforded patentable weight. Hainfeld et al., disclose thiol gold clusters comprising a substrate that is a lipid which form micelles and vesicles, (Hainfeld at col. 2, line 61-67, col. 8, lines 43-65) having metal cores, reading on metal clusters of about 1.4 nm in diameter, reading on radii with the range of 0.7 nm to about 1.8 nm (as in the claims) and that comprise about 50-70 metal atoms that that forms monodispersed, thiol-stabilized gold clusters.

It is respectfully noted that the specification at p. 8, lines 8-10, states that "[m]onodispersed" refers to the formation of a population of metal clusters of substantially the same size, i.e., having substantially the same radiuses (or diameters)." Thus, the examiner respectfully submits that clusters comprising a range of 50-70

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atoms represent clusters of substantially the same size, particularly given that the specification, at p. 8, lines 12-24, discloses that “[a] completely monodispersed population is one in which the size of the metal clusters is identical. However, complete monodispersity is difficult, if not impossible, to achieve.”

Hainfeld, at col. 8, line 64, discloses linking the thiol gold cluster to a polylysine linker, reading on a polylysine scaffold. As the teaching of Hainfeld in regards to the polylysine linker meets the claimed limitation of a polylysine scaffold, the polylysine of Hainfeld would have, absent evidence to the contrary, a lateral definition of about 10 Å, as in instant claims 2, 4, and 13.

Hainfeld, at col. 8, line 55-65, teach coupling the gold cluster bound to the organic polylysine group and then to the lipid, reading on the claimed metal clusters being coupled to the scaffold and the scaffold being coupled to the substrate; Hainfeld at col. 8, lines 55-58, teach these said coupling according to the formula M-or-L, reading on coupling at predetermined positions.

Hainfeld et al., at col. 7, lines 1-22, teach thiol ligands that include alkyl thiols, aryl thiols, and thiolbenzoic acid, reading on the thiol ligands of instant claims 7, 9, 19; and variations thereof.

It is noted that “polylysine” *inherently* is a “helical peptide” within the presently claimed scope since “The free base form of polylysine readily forms an alpha helix” and “[M]oreover, lysine provides a terminal amino group that is oriented favorably in the alpha helix for ligand exchange reactions with the ligand-stabilized metal clusters”. See specification at page 15, lines 15-24. Thus claim 3 is rendered obvious.

Hainfeld et al., do not teach mercaptoundecanoic acid, as in claims 1 and 11; and do not teach gold clusters that are electrostatically coupled to the scaffold, as in claim 6.

**Kornguth et al., US 5,629,213 A**, throughout the patent and abstract, and at col. 2, line 52-col. 3, line 2, teach arrays comprising 11-mercaptoundecanoic acid, gold, and polylysine through electrostatic coupling, as a preferred embodiment, because 11-mercaptoundecanoic acid is capable of adsorption onto gold through the sulfhydryl group, and the resulting polyanionic surface provides for the robust yet reversible electrostatic adsorption of the polycation polylysine. Kornguth et al., at col. 2, lines 41-51, teach arrays comprising substrates of gold.

It would have been *prima facie* obvious, at the time the invention was made, for one of ordinary skill in the art to have made and used an array of gold clusters, comprising 11-mercaptoundecanoic acid ligand-stabilized gold clusters; and wherein gold clusters that are electrostatically coupled to the scaffold.

One of ordinary skill in the art would have been motivated to make and use an array of gold clusters, comprising 11-mercaptoundecanoic acid ligand-stabilized gold clusters; and wherein gold clusters that are electrostatically coupled to the scaffold, because Kornguth et al. disclose that 11-mercaptoundecanoic acid is capable of adsorption onto gold through the sulfhydryl group, and the resulting polyanionic surface provides for the robust yet reversible electrostatic adsorption of the polycation polylysine.

One of ordinary skill in the art would have had a reasonable expectation of success in making and using array of gold clusters, comprising 11-mercaptoundecanoic acid ligand-stabilized gold clusters; and wherein gold clusters that are electrostatically coupled to the scaffold, because the polycationic character of polylysine was well-known in the art ; and because the use of 11-mercaptoundecanoic acid to adsorb onto gold was well known in the art, as evidenced by Templeton et al., J. Am. Chem. Soc. 1998, vol. 120, pp. 4845-4849; and Bain et al., J. Am. Chem. Soc. 1989, vol. 111, pp. 321-335.

### ***Double Patenting***

27. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

28. Claims 1-7 and 9-13 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-3 of U.S.

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Patent No. 6,872,971. Although the conflicting claims are not identical, they are not patentably distinct from each other.

This rejection maintains the reasons of record, as set forth in the previous Office action, in the rejection of claims 1-3. This rejection of the new added claims is necessitated by applicant's amendments to the claims.

The patent claims teach devices which employ organized metal (defined in the disclosure to include Ag/Au/Pt/Pd and mixtures: see '971: col 3, lines 25-55) cluster (one dimensional) arrays" which are within the scope of the presently claimed invention: e.g. radii spaced apart @ 0.4 nm-1.8 nm (vs. @0.7 nm to 1.8nm presently claimed) utilizing "biomolecular scaffold" ( DNA/alpha helical forming polypeptides : e.g. see col. 3) which are "electrically isolated from one another" (e.g. formed by aligning in electric field: see col. 15 and/or distance or less than about 5nm); and has a linear increase in current above a threshold in applied voltage (patent claim 3).

The '971 Patent claims in claim 1:

An electronic device that operates at or about room temperature based on the Coulomb blockade effect, comprising: a first cluster comprising a metal cluster core having a radius of between about 0.4 nm and about 1.8 nm; and a second such cluster physically spaced apart from the first metal cluster at a distance of less than about 5 nm, where the physical separation between the first and second clusters is maintained by the clusters being coupled to a biomolecular scaffold.

The claims of the '971 Patent are further drawn to the electronic device of claim 1, comprising first and second biomolecular scaffolds, each with coupled clusters,



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where the first and second scaffolds intersect. The claims of the '971 Patent are further drawn to the electronic device of claim 1, where the device exhibits a linear increase in the number of electrons passing between the first and second clusters as the potential difference between the two clusters is increased above a threshold value.

The '971 Patent defines metal clusters as gold nanoparticle arrays comprising thiol ligands, including 11-mercaptoundecanoic acid (col. 6, Figure 11; and as in instant claim); and defines scaffolds as including polylysine scaffolds (col. 3, lines 52-67); defines devices as comprising substrate a comprising silicon, silicon nitride, ultraflat glass, or gold, ('971 Patent at the abstract, and col. 14, lines 10-20).

### Response to Arguments

Applicant argues this rejection is a provisional rejection because instant claims 1-3 have not been allowed. Applicant states that "at the appropriate time" applicant respond to this rejection with a terminal disclaimer, as both the instant application and the '971 Patent are owned by a common assignee

Applicant's arguments, entered 10/13/2005, have been fully considered but they are not persuasive. The instant rejection is not a provisional rejection because the '971 Patent is an issued patent. The rejection is maintained.

### **Conclusion**

29. Claims 1-7 and 9-13 stand finally rejected.

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30. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

31. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mark L. Shibuya whose telephone number is (571) 272-0806. The examiner can normally be reached on M-F, 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter Paras can be reached on (571) 272-4517. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Mark L. Shibuya  
Examiner  
Art Unit 1639